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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,519	03/23/2004	Lei Li	TI-36904	2731

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EXAMINER
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DANG, PHUC T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 07/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/806,519	Applicant(s) LI ET AL.	
	Examiner PHUC T. DANG	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on election filed July 1, 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 15-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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## **DETAILED ACTION**

### **Restriction/election**

1. Applicant's election without traverse of Group I (claims 1-14) filed on July 1, 2005, drawn to an integrated circuit having copper interconnecting metallization and withdrawn Group II (claims 15-19).

Applicants have the right to file a divisional application covering the subject matter of the non-elected claims.

### **Specification**

2. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### **Claim Rejections - 35 USC § 102**

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-3, 5 and 7-13 are rejected under 35 U.S.C. 102 (e) as being anticipated by Test et al., hereinafter "Test" (U.S. Patent No. 6,800,555 B2).

Regarding claim 1, Test discloses an integrated circuit having copper interconnecting

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metallization, a portion of the metallization exposed to provide a contact pad to the integrated circuit, comprising:

one or more layers of conductive barrier metals (105, Fig. 1A) positioned on the exposed portion of the copper metallization (103, Fig. 1A);

a bondable metal layer (106, Fig. 1A) positioned on the barrier layer, the bondable layer having a thickness suitable for wire bonding, and an exposed surface (col. 5, line 54-col. 6, line 2); and

a protective overcoat layer (101, Fig. 1A) surrounding the bondable layer (106, Fig. 1A) so that the exposed surface of the bondable layer (106, Fig. 1A) lies at or below the exposed surface of the overcoat layer (101, Fig. 1A).

Regarding claim 2, Test discloses all the features of the claim 2 are similar to claim 1 above including a plug of bondable metal positioned on the barrier layer. The bondable metal has a thickness (see col. 6, lines 6-8 of Test) referring to as a plug as cited in Specification on page 9, lines 30-31.

Regarding claim 3, Test discloses the overcoat thickness ranges from about 0.6 to 1.5  $\mu\text{m}$ . (col. 4, lines 1-2).

Regarding claim 5, Test discloses the overcoat layer comprises one or more layers of silicon nitride silicon oxy-nitride, silicon dioxide, silicon carbide, or other moisture-retaining compounds (col. 4, lines 1-2)

Regarding claim 7, test discloses the bondable metal plug is aluminum or an aluminum alloy (col. 6, lines 6-8).

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Regarding claim 7, Test discloses the plug has a thickness between about 0.4 and 1.4  $\mu\text{m}$ .

Regarding claim 8, Test discloses comprising a ball bond attached to the plug (Fig. 1B)

Regarding claim 9, Test discloses the barrier layer comprises tantalum nitride (col. 4, lines 4-9).

Regarding claim 10, Test discloses the barrier layer is selected from a group consisting of tantalum, titanium, tungsten, molybdenum, chromium, vanadium, alloys thereof, stacks thereof, and chemical compounds thereof (col. 5, lines 37-53).

Regarding claim 11, Test discloses the barrier layer has a thickness between about 0.02 and 0.03  $\mu\text{m}$  (col. 5, lines 51-52).

Regarding claim 12, Test discloses the barrier layer is patterned to the same area as the contact pad portion of the metallization (Fig. 1A).

Regarding claim 13, Test discloses the plug of bondable metal is patterned to the same area as the contact pad portion of the metallization (Fig. 1A).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4, 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Test in view of Efland et al., hereinafter "Efland" (U.S. Patent No. 6,025,275).

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Regarding claim 14, Test discloses all the features of the claimed invention as discussed above, but does not disclose a portion of the overcoat layer overlaps the perimeter of the plug.

Efland, however, discloses a portion of the overcoat layer overlaps the perimeter of the plug [Fig. 1A].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the above discussed teaching of Test as taught by Efland for a purpose of achieving a good isolation between the electrical interconnections.

Regarding claim 6, Test discloses all the features of the claimed invention as discussed above, but does not disclose the bondable metal plug is aluminum or an aluminum alloy.

Efland, however, discloses the bondable metal plug is aluminum or an aluminum alloy [col. 6, lines 62-63].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the above discussed teaching of Test as taught by Efland for a purpose of improving the electrical interconnections.

5. Test discloses the claimed invention except for the process parameters as claimed in claim 4. However, the selection of the claimed process parameters would have been obvious to one having ordinary skill in the art at the time the invention was made to form the overcoat layer overlaps between about 0.1 and 0.3  $\mu\text{m}$  over the plug perimeter, since it is well settle that when the general conditions of a claim are discloses in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

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### Conclusion

6. Applicants are advised to cancel the non-elected claims of Group II (claims 15-19) upon response to the next Office action if the application is considered to be allowed.
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.
8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300 for regular communications and After Final communications.
9. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PP



Primary Examiner

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